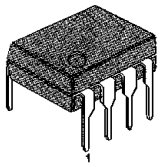
KA2803B EARTH LEAKAGE DETECTOR

LOW POWER CONSUMPTION EARTH LEAKAGE DETECTOR

The KA2803 is designed for use in earth leakage circuit interrupters, for operation directly off the AC line in breakers. The input of the differential amplifier is connected to the secondary coil of ZCT (Zero Current Transformer). The amplified output of differential amplifier is integrated at external capacitor to gain adequate time delay that is specified in KSC4613.

The level comparator generates high level when earth leakage current is greater than some level.

8 DIP



FUNCTIONS

- Differential amplifier
- Level comparator
- Latch circuit

FEATURES

- Low power consumption P_D =5mW, 100V/200V)
- Built-in voltage regulator
- High gain differential amplifier (V_T =13.5mV)
- 1mA output current pulse to trigger SCR'S
- Low external part count, economic
- Mini-dip package (8 Dip), high packing density
- High noise immunity, large surge margin
- Super temperature characteristic of input sensitivity
- Wide operating temperature range (T_A = - 25℃ ~ +80℃)

ORDERING INFORMATION

Device	Package	Operating Temperature
KA2803B	8 DIP	-20 ~ + 80℃

APPLICATION CIRCUIT

1. Full Wave Application Circuit

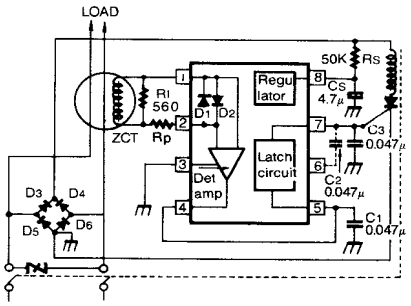


Fig. 1

2. Half Wave Application Circuit

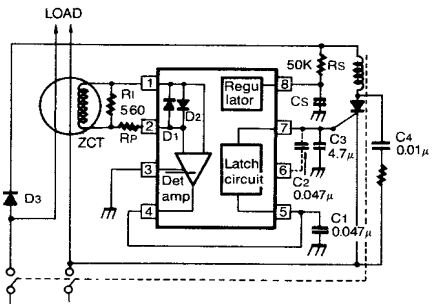


Fig. 2

FAIRCHILD SEMICONDUCTOR™

ABSOLUTE MAXIMUM RATINGS (T_A = 25℃)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	20	V
Supply Current	I_{CC}	8	mA
Power Dissipation	P_D	300	mW
Lead Temperature (soldering 10 sec)	T_{LEAD}	260	℃
Operating Temperature	T_{OPR}	- 25 ~ + 80	℃
Storage Temperature	T_{STG}	- 65 ~ + 150	℃

ELECTRICAL CHARACTERISTICS (T_A = 25℃)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Current 1	I_{CC}	V_{CC} =12V (-25℃) V_R-V_I =300mV (25℃) (80℃)		400	580 530 480	μA μA μA
Trip Voltage	V_T	V_{CC} =16V(-25℃ ~ 80℃) V_R-V_I =X	10	13.5	17	mVrms
Differential Amplifier Output Current 1	$I_{O(D)}$	V_{CC} =16V (25℃) V_R-V_I =30mV V_{OD} =1.2V	12		30	μA
Differential Amplifier Output Current 2	$I_{O(D)}$	V_{CC} =16V(25℃) V_{OD} =0.6V V_R, V_I short	17		37	μA
Output Current	I_O	V_{SC} =1.4V V_{OS} =0.8V V_{CC} =12V (-25℃) (+25℃) (+80℃)	-200 -100 -75			μA μA μA
Latch on Voltage	V_{SCON}	V_{CC} =16V (25℃)	0.7		1.4	V
Latch Input Current	I_{SCON}	V_{CC} =12V (25℃)			5	μA
Output Low Current	I_{OSL}	V_{CC} =12V (-25℃ ~ 80℃) V_{OSL} =0.2V	200			μA
Diff. Input Clamp Voltage	V_{IDC}	I_{IDC} =100mA (-25℃ ~ 80℃)	0.4		2	V
Maximum Current Voltage	V_{SM}	I_{SM} =7mA (-25℃)	20		28	V
Supply Current 2	I_{S2}	V_R-V_I =X(25℃ ~ 80℃) V_{OS} =0.6			900	μA
Latch Off Supply Voltage	V_{SOFT}	V_{OS} =high(25℃)	7.0			V
Response Time	T_{ON}	V_{CC} =16V(25℃) V_R-V_I =0.3V	2		4	msec

APPLICATION NOTE

(refer to full wave application circuit Fig. 1)

The Fig 1 shows the KA2803B connected in a typical leakage current detector system.
The power is applied to the V_{CC} terminal (Pin 8) of the KA2803B directly from the power line.
The resistor R_S and capacitor C_S are chosen so that pin 8 voltage is at least 12V.
The value of C_S is recommended above 1μ F at this time.
If the leakage current is at the load, it is detected by the zero current transformer (ZCT).
The output voltage signal of ZCT is amplified by the differential amplifier of the KA2803B internal circuit and appears as half-cycle sine wave signal referred to input signal at the output of the amplifier.
The amplifier closed loop gain is fixed about 1000 times with internal feedback resistor to compensate for zero current transformer (ZCT) Variations.
The resistor R_L should be selected so that the breaker satisfies the required sensing current.
The protection resistor R_P is not usually used put when the high current is injected at the breaker, this resistor should be used to protect the earth leakage detector IC the KA2803B.
The range of R_P is from several hundred Ω to several kΩ .
The capacitor C_1, is for the noise canceller and standard value of C_1 is 0.047μ F. Also the capacitor C_2 is noise canceller capacitance but it is not usually used.
When high noise is only appeared at this system 0.047μ F capacitor may be connected between pin 6 and pin 7.
The amplified signal is finally appeared to the Pin 7 with pulse signal through the internal latch circuit of the KA2803B.
This signal drives the gate of the external SCR which energizes the trip coil which opens the circuit breaker.
The trip time of breaker is decided by the capacitor C_3 and the mechanism breaker.
This capacitor should be selected under 1μ F for the required the trip time.
The full wave bridge supplies power to the KA2803B during both the positive and negative half cycles of the line voltage.
This allows the hot and neutral lines to be interchanged.
If your application want the detail information, request it on our application circuit designer of KA2803B.

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™
CoolFET™
CROSSVOLT™
E^2CMOS^{TM}
FACT™
FACT Quiet Series™
FAST®
FASTr™
GTO™
HiSeC™
ISOPLANAR™
MICROWIRE™
POP™
PowerTrench™
QS™
Quiet Series™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
TinyLogic™
UHC™
VCX™

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.
As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.